HOME OFFICE.—DANGEROUS TRADES COMMITTEE.

FOURTH INTERIM REPORT

OF THE

DEPARTMENTAL COMMITTEE

APPOINTED TO INQUIRE INTO AND REPORT UPON

CERTAIN MISCELLANEOUS DANGEROUS TRADES.

SUPPLEMENTARY REPORT AND EVIDENCE ON THE MANUFACTURE AND USE OF GRINDSTONES AND ON FILE CUTTING.

Presented to Parliament by Command of Her Majesty.

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MANUFACTURE AND USE OF GRINDSTONES AND FILE CUTTING.

SUPPLEMENTARY REPORT.

In presenting the evidence taken on the questions of Grinding and File cutting, the Dangerous Trades Committee desire to point out the steps which they took to obtain a complete statement of the views of all parties interested in these two trades. They venture, therefore, to transmit copies of two letters written by Commander Hamilton P. Smith, R.N., to Mr. Macro Wilson, law clerk to the Cutlers' Company, and copies of the answers received by him from Mr. Macro Wilson. Similar letters were also sent by Commander Smith to the Federated Trades Council of Sheffield.

In the letters marked W, X, Y, Z, it is shown that two intimations were sent to Mr. Macro Wilson, a partner in the firm of Younge, Wilson and Company, who are the law agents for both the Cutlers' Company and the Sheffield Chamber of Commerce. An official letter signed by Sir Kenelm Digby, dated 27th October 1897, alludes to Mr. Macro Wilson's letter of July 30th as being on behalf of the Factory Acts Committee of the Cutlers' Company and the Sheffield Chamber of Commerce. It will be seen that the information sent to Mr. Macro Wilson was first stating the nature and scope of the Committee's inquiry, in order that evidence might be prepared and arrangements made as to witnesses, &c., and secondly of a detailed character, stating precise dates and inviting evidence. A copy will be found of the public notice which appeared in the "Sheffield Daily Telegraph," and in the "Sheffield and Rotherham Independent." This notice is similar in substance to those which appeared at different times in the London press and in that of Edinburgh, Glasgow, Birmingham, and Manchester and of other places visited by the Committee. Equal opportunities for stating their case are in all instances given to employers and employed: the Committee regret that in Sheffield these opportunities were neglected by the employers. The public invitation to manufacturers elicited no response; the special invitation elicited no response; but in spite of the embarrassment which this neglect laid upon their inquiry, the visits paid to representative grinding wheels, and the courtesy of employers in other centres placed much useful and valuable information at their disposal. Though the Chamber of Commerce did not, in addition to the general invitation extended to all manufacturers, receive a specific invitation such as that contained in Commander Smith's letters, this fact cannot be held to account for the lack of response on the part of the Cutlers' Company. For the Committee's efforts to secure their co-operation elicited nothing beyond mere acknowledgments. Having pointed out these considerations to the Secretary of State in a letter dated April 30th, the Chairman received a reply dated May 15th, in which the following passage occurs:—"I am to add that it appears to "the Secretary of State that sufficient steps were taken by your Committee to give "notice of their inquiry at Sheffield to the parties interested therein."

Besides the evidence which is presented herewith, the Committee, as stated in their Report, gained much valuable information from employers, managers, foremen, and workmen in the numerous factories and workshops which they visited. They also had before them the evidence given before the Royal Commission on Labour, and the conclusions arrived at by a Departmental Committee of the Home Office which sat in 1893 on the Grinding trade.

Among the documents now presented will be found written statements handed in by certain witnesses. In some cases these statements were supplemented by oral evidence. In other cases either where the witnesses requested that the opinions which they expressed should not be coupled with their names, or where there was a general understanding to that effect, no name has been attached to the evidence given.

It should be borne in mind that the Committee had the advantage of meeting in Sheffield a large number of representatives of various trades, most of whom belonged to one of the two industries under consideration. There were twenty-four gentlemen present, all either officials or leading members of trade societies, and after general views on the industries in question had been expressed and discussed, representatives were chosen to give evidence before the Committee.

The Committee also present certain documents of a supplemental character, which include :—

1. Two letters from the certifying surgeons for Sheffield ;
2. A return of cases of lead poisoning among file cutters, reported to the Factory Department in Sheffield, for the 10 months July 1898 to June 1899 ; and
3. Extracts from a pamphlet by Dr. Sinclair White to which allusion was made both by the author and other witnesses.
4. Analysis of dust taken from file cutting shops, by Dr. Thorpe.

That the certifying surgeons were not called as witnesses at the original sitting of the Committee in Sheffield was due to the fact that until about two years ago they were not required to report on cases of plumbism in file cutting shops, and consequently had not acquainted themselves with the conditions under which the trade is conducted.

The return of cases of lead poisoning will be observed to include only those reported to the Inspector of Factories for Sheffield ; the return therefore represents but a proportion of the illness which actually arises. Having regard to the recent date of the requirement to report such cases, and to the fact that the reports have been chiefly drawn from a few only among the many medical practitioners in Sheffield, the Committee believe that this return even for Sheffield is probably incomplete.

The Committee attach importance to Dr. Sinclair White's views, not only from his recognised ability and professional standing, but also because his position as Medical Officer of Health for Sheffield for three years afforded him exceptional opportunities of forming an opinion, and because he has made a special study of these matters.

H. J. TENNANT.
MAY TENNANT.
THOMAS OLIVER, M.D.
H. P. SMITH.

W.

Office of H.M. Inspectors of
Factories and Workshops,
21, Fargate, Sheffield,
13th March 1896.

DEAR SIR,

A DEPARTMENTAL Committee, presided over by Mr. H. J. Tennant, M.P., of which I am a member and secretary, will visit Sheffield and take evidence. The object of the Committee is to decide whether in certain trades scheduled for inquiry there is any process likely to be injurious to health or dangerous to life, and to decide whether the trades should be scheduled as dangerous trades, under section 8 of Factory Act of 1891, and, if so scheduled, to recommend Special Rules.

I enclose a list of the trades referred to. Those that particularly affect this district appear to be file cutting (where cases of lead poisoning are common), and the manufacture and use of grindstones and emery wheels.

The time for the visit of the Committee is not yet fixed, but as doubtless many members of the Cutlers' Company could give advice which would be much valued, and as a little time for consideration may be desirable, I venture to hope that you will submit this letter for the consideration of the Company.

I am, &c.
H. P. SMITH,
H.M. Inspector of Factories.

The Clerk to the Cutlers' Company,
Sheffield.

X.

COPY OF REPLY.

Cutlers' Hall, Sheffield,
16th March 1896.

DEAR SIR,

I BEG to acknowledge the receipt of your letter of the 13th instant, which shall be laid before the Cutlers' Company at their next meeting.

The next fixed meeting of the Company is on the 2nd Monday in April, which I trust will be in sufficient time for you.

Yours, &c.
CHAS. MACRO WILSON,
Law Clerk to the Cutlers' Company.

Commander H. P. Smith, R.N.,
H.M. Inspector of Factories,
21, Fargate.

Y.

Office of H.M. Inspectors of
Factories and Workshops,
21, Fargate, Sheffield,
4th November 1897.

DEAR SIR,

ON March 13th, 1896, I intimated to you that a Committee had been appointed by the Secretary of State, Home Department, to inquire into matters affecting the health and safety of persons engaged in various occupations. I sent you a list of the trades scheduled for inquiry, and I intimated that inquiries would be made in Sheffield.

Circumstances have prevented the Committee from coming here before, but as at present arranged the members, or some of the members, will be in Sheffield between the 22nd and 27th of this month. Mr. H. J. Tennant, M.P., will preside.

The particular questions that will occupy their attention will be—

The use of "converters" in the manufacture of Bessemer steel, the object being to consider the advisability of using automatic locking arrangements such as are already found in a very large number of works throughout the country to keep the converter in its place in the event of fracture or other defect in the hydraulic pressure pipes.

The manufacture of files, with a view to considering whether anything can be done to reduce the large number of cases of lead poisoning so prevalent amongst file cutters.

The manufacture and use of grindstones; to consider whether at the quarry, in transit, storage, hanging, or in use, or whether by testing before delivery, anything can be done to lessen the number of accidents caused by the breakage of grindstones.

Any suggestions or evidence coming from the Cutlers' Company as a body, or from individual members of the Company, will be very welcome, and any communication directed to me will receive early attention, and I will, as far as possible, arrange to suit the convenience of any one who may desire to see the Committee.

I remain, &c.
H. P. SMITH,
Member and Secretary of the
Home Office Committee on Dangerous Trades.

C. Macro Wilson, Esq.,
Law Clerk to the Cutlers' Company,
Cutlers' Hall, Sheffield.

Z.

COPY OF REPLY.

Cutlers' Hall, Sheffield,
5th November 1897.

DEAR SIR,

I HAVE your letter of the 4th inst. herein, intimating the sitting of this Committee towards the end of this month.

I will take an early opportunity of bringing your letter before the Master Cutler.

Yours, &c.
CHAS. MACRO WILSON,
Law Clerk to the Cutlers' Co.

Commr. H. P. Smith.

THE "SHEFFIELD DAILY TELEGRAPH," AND THE "SHEFFIELD AND ROTHERHAM INDEPENDENT," SATURDAY, NOVEMBER 13, 1897.

Home Office Committee on Dangerous Trades.

Inquiry in Sheffield.

In July 1895, a Committee was appointed by the Secretary of State for the Home Department to inquire into the conditions of work as they affect the health and safety of the operatives in the industries and processes named on the appended list.

The Committee was constituted as follows:—Chairman, Mr. H. J. Tennant, M.P., who, as unpaid private secretary to his brother-in-law, Mr. H. Asquith, late Secretary of State for the Home Department, and as a member of similar committees, had gained considerable experience in regard to such inquiries; Miss May Edith Abraham (now Mrs. H. J. Tennant), then H.M. Lady Superintending Inspector of Factories, and formerly a member of the Labour Commission; Professor Thomas Oliver, M.D., physician to the Royal Infirmary, Newcastle-on-Tyne, and formerly member of the Lead Committee; and Hamilton P. Smith, retired Commander, Royal Navy, one of H.M. Inspectors of Factories (secretary of the Committee). Professor Charles V. Boys, F.R.S., was appointed in 1897 as an additional member for the purpose of assisting the Committee in their inquiries relating to electrical generating works.

Two interim reports have been presented, dealing with india-rubber works, paper staining, colouring, and enamelling, dry cleaning, bronzing, use of steam locomotives in factories, the use of inflammable paints in shipbuilding yards, the bottling of aerated waters, and electrical generating works.

On Monday, November 22nd, the Committee will visit Sheffield, and it is hoped they will be able to remain till the end of the week. The special questions that they will consider in this district will be:—

The use of "converters" in Bessemer steel works, with a view to reporting as to the desirability of having automatic locking arrangements for the converters, which would keep them in their place in the event of fracture or other defect in the hydraulic pressure pipes.

The manufacture and use of grindstones, it being desirable to ascertain whether at the quarry, by testing, in transit, storage, hanging, or in use, anything can be done to lessen the number of fatal and serious accidents caused by the breakage of grindstones.

File cutting.—To decide whether any practicable suggestions can be made which would lessen the very large number of cases of lead poisoning, now so prevalent amongst those engaged in this occupation.

The secretary of the Committee (Commander Hamilton P. Smith, R.N., 21, Fargate) will be very glad to receive at his office, and lay before the Committee, any suggestions bearing on these matters, and he will be pleased to make suitable arrangements for any persons who may wish to offer advice or to give evidence.

Dangerous Trades Committee.

List of Trades, &c. under Consideration.

India-rubber Works.
Paper Staining, Colouring, and Enamelling.
Dry Cleaning.
Basic Slag Works and Manufacture of Silicate Cotton.
Electric Generating Works.
Sole Stitching by American Machinery.
Glass Polishing.
File Cutting.
Bronzing and Metallachrome Powder in Lithographic Works.
Flour Mills.
Use of Converters in Metal Works.
Use of Steam Locomotives in Factories.
Licking of Labels for Reels in Thread Mills.
Use of Inflammable Paints in Shipbuilding Yards.
Galvanized-iron Works.
The Process of Dyeing with Arseniate of Soda.

The Manufacture and Use of Grindstones and Emery Wheels.
The Use of Lead in various forms in Print and Dye Works.
The Testing of Bottles by Compressed Air.
The Bottling of Aerated Waters.
The Manufacture of Salt.
Ending and Mending in Velvet Works.

THE MANUFACTURE AND USE OF GRINDSTONES.

Upon the "*Manufacture and Use of Grindstones*" papers were handed in by certain gentlemen, who have expressed their willingness that these statements should be published. They include:—

I. Summary of evidence taken in Birmingham, with letter of explanation from Mr. S. H. Knyvett, H.M. Inspector of Factories.
II. Letter with report on an inquiry into the death of David Ferguson caused by injuries received from a bursting grindstone, by Mr. Archibald Newlands, H.M. Inspector of Factories.
III. Letter and suggestions by Mr. Charles Helliwell, of Hackenthorpe, near Sheffield.
IV. Written statement by witness B., an experienced grinder.
V. Copy of a Resolution passed by the Sheffield Trades Council on November 12th, 1897.

I.

LETTER FROM Mr. S. H. KNYVETT, H.M. INSPECTOR OF FACTORIES.

35, Paradise Street, Birmingham,
February 4th, 1898.

Dear Captain Smith,

While having the advantage of accompanying the Committee at Redditch on Wednesday, I gathered the points upon which the members were seeking information, and yesterday I paid visits to nearly all of the factories in my district in which grinding is carried on to any extent with the view of collecting additional similar information.

I forward you some notes, the result of my inquiries. They will not, I am afraid, add much, if anything, to what you have already learnt from your much larger field at other places, but you may regard them as giving an accurate summary of the conditions as to the fixing and testing of stones now obtaining in Birmingham.

I have separated the notes into the following headings:—

A. Number of stones running in the works, and from where procured.
B. Treatment of stones before hanging, and method of hanging.
C. Methods of testing.
D. Speeds, and relations of pulleys to stones.
E. Occasions of flying stones, and of detection of faults.
F. Special remarks received.

I am, &c.
S. H. KNYVETT.

Capt. H. P. Smith, R.N., Secretary,
Dangerous Trades Committee.

Robert Mole and Sons, Granville Street, Birmingham, Sword Cutlers to the War Office.

A. Ten stones, mostly from Leeds and Arley (in Staffordshire), worked from 6 feet down to 2 feet 6 inches.

B. Stones come from quarry partially dressed, they are then further dressed and raced, and are hung by square spindles in round holes, being fixed by wedges. This latter plan thought preferable to plates.

C. After being hung there is no sort of testing. The stones are constantly being "hacked" by the men, and any careful man would detect a flaw during the process of hacking, when he would report the stone and it would immediately be taken out.

E. The senior partner informed me that no stone had fled for more than 20 years. Very few stones had to be taken out.

F. It was most desirable that the horsings should be heavy, and that attention should be paid to the chains which, without doubt, would in time oxidise, but the firm considered that the men should (and would) look after such matters themselves.

To minimise the danger from a possible flying stone the firm had strengthened the wall facing the stones with strong baulks of timber.

The quarry owners were excessively difficult persons to deal with in respect of doubtful stones, and probably small grinders often used bad stones, not being able to return them or to afford to make "corks" of them. This phrase appears to be applicable both to stones thrown on one side from faults or from having been ground down to the end of its use.

WYNN, TIMMINS & Co., COMMERCIAL STREET, BIRMINGHAM, STEEL TOY MANUFACTURERS.

A. Eight stones, mostly from Rowsley, worked from 6 feet to 20 inches.

B. Stones come already dressed, and are then raced and hung. Firm are proposing to substitute plates for wedges, believing that plates are best.

C. No tests are used, it being thought that men always detect flaw while hacking, which is done at least once in every day.

D. I could not be informed by the partner whom I saw as to the actual speeds, but the revolutions were under 500 per minute.

E. No stone had fled within the last 10 years.

F. Heavy horsings were most desirable, and careful attention to the condition of the chains.

A. W. WILLS AND SONS, NECHELLS PARK ROAD, BIRMINGHAM, EDGE TOOL MANUFACTURERS.

A. Thirty-seven stones, somewhat soft in character, and usually from Rowsley, worked from 6 feet 6 inches to 30 inches.

B. Stones come partially dressed and are then further dressed and raced. Hung with wedges, which are considered preferable. Before being hung stones should be allowed to rest for some months in the yard, as exposure to the weather improves them after being dressed, and moreover flaws are more easily detected when this has been done.

C. Before being used stones are always run for two hours at full speed.

D. Speeds are calculated not by revolutions, but by surface speed, namely, the distances run by a given spot on a surface within a minute. The usual surface speed would be from 3,000 feet to 3,300 feet per minute, which would show about 168 revolutions.

A 6-feet stone of average hardness would be run on a 44-inch pulley, while a harder stone of the same size would have a 42-inch pulley. A 4-feet wheel would have a 32-inch pulley, the speed being thus greater.

E. No stone has fled for the last 10 years, and stones were very rarely obliged to be taken out.

Many years ago five stones had fled at once, through some failure on the part of the governors, but luckily no one was hurt on that occasion.

F. Very heavy horsings were used, the foreman grinder telling me I should find them to be three times the weight of those ordinarily used in the "mills" (the Birmingham equivalent to the "wheels" in Sheffield).

The firm had strengthened the walls facing the stones with buttresses of blue brick.

JOHN YATES & Co., LIMITED, ROCKY LANE, BIRMINGHAM, EDGE TOOL MANUFACTURERS.

A. Twenty stones, mostly from Arley. Worked from 6 feet to 2 feet.

B. Come wholly dressed from quarry and are then raced. Six months exposure in yard desirable. Wedges used.

C. All stones are tested before being used, by being run for never less than two hours (and often for a longer time if any doubt is felt about a stone), and at a slightly increased speed, the pulley used being 2 inches smaller than the ordinary one.

When being tested the stones are run through 2 inches or 3 inches of water at the bottom of the stone hole, this tending to draw attention to latent flaws.

D. Six feet stones are run at 180 revolutions a minute, and 4-feet stones at 250 revolutions.

E. About one stone at an average flies in each year, but no one has been hurt thereby for more than 18 years.

F. Heavy horsings are used, and men are expected to see that their chains are in good condition; it would be easy for a man to tell when his chains had become rusty, and they would at once be changed.

The firm inspect the stones on their arrival at the goods station, and immediately return all stones which are obviously bad to the merchants. The firm believe that these returned stones are knowingly sold afterwards to small masters, who get them cheaply.

A. & F. Parkes & Co., Limited, Dartmouth Street, Birmingham, Edge Tool Makers.

A. Twenty-five stones, from Rowsley and Rotherham.

B. Stones come dressed, and are afterwards raced. While being kept in the yard preparatory to being hung, they should be laid one on the top of another, a space being kept between them by wedges to enable the air to get to the sides; and they should not, as too often is done, be allowed to stand upright, as that plan tends to cause the lower half of the stone to become damp, and not so fit for use when they come to be hung. The stones are hung with plates, these being thought best.

C. The only test the stones are submitted to is in the racing, when the men ought to be able to detect any flaws.

D. Stones are always worked with pulleys of half their diameter. This should (for the information of the men) be the invariable rule, any required adjustment of speed being made by alteration of the size of the pulley on the countershaft.

E. In two of the three mills there have been no flying stones for fifteen and eighteen years respectively. In a third mill one stone has flown during the last seven years.

F. This firm considers that the most important point is to have a first-rate engine, and that this matter is of more importance in grinding than in any other manufacturing process. Formerly they had an old Boulton and Watts engine, which only made 21 revolutions a minute, and this engine could not be depended upon not to make a variation of three or four revolutions in that time. This variation might cause a corresponding variation of 45 or 50 revolutions per minute in the working of the stones, and accidents were at that time of not unusual occurrence. Now the firm have an engine which makes 70 revolutions a minute with absolutely no variation, and consequently the stones are run at an absolutely uniform speed.

The firm place their entire confidence in this provision. They have fairly heavy horsings, but do not attach much importance to the point, nor to that of the chains. The former are about 4 feet by 2 in size.

Vaughan Bros., Dartmouth Street, Birmingham, Edge Tool Makers.

A. Seven stones, worked from 6 feet to 30 inches. Derby and Yorkshire.

B. Brought dressed from the quarry and then raced. Hung with wedges.

C. Testing not considered at all necessary, as the men should discover any flaws.

"Racing" could not afford any test (as suggested elsewhere) as the stones during that process would be running at much below their ordinary speed.

D. Speed about 200 revolutions, 6 feet stones have 38-inch pulleys.

E. No stone had fled for 10 years. About one removed per year.

F. The Brades Company, Limited, Oldbury, are supposed to have the best system of fixing and maintaining grindstones in this neighbourhood.

The main point is to have a first-class engine, working preferably with a low pressure, and well governed.

It is most important to keep the stones clean, so that flaws may be at once detected.

II.

LETTER FROM MR. ARCHIBALD NEWLANDS, H.M. INSPECTOR OF FACTORIES.

Office of H.M. Inspectors of Factories,
Regent Chambers,
121, West Regent Street, Glasgow,
28th July 1898.

DEAR SIR,

DURING a conversation with Dr. Oliver on Tuesday, I informed him of a case of a bursting grindstone that I had investigated at Paisley some time ago. He asked me to forward you a short report on the matter—this I have the honour of doing, and hope it may prove of some service to you.

I am, &c.
ARCHIBALD NEWLANDS.

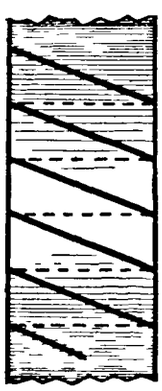
Commander H. P. Smith, R.N.,
21, Fargate, Sheffield.

REPORT ON INQUIRY INTO DEATH OF DAV. FERGUSON, CAUSED BY THE BURSTING OF A GRINDSTONE.

From perusal of copy of Notes of Evidence under the Fatal Accidents Inquiry Act, enclosed herewith, it will be seen that the grindstone measured 56 inches in diameter, and was run at a speed of 280 revolutions per minute, thus giving a lineal speed of grinding surface of 4,275 feet per minute. The grindstone, which was of Newcastle stone, was fixed by means of side plates and round hole.

It was contended that the bursting of this stone was due to the style of hacking adopted by deceased—this, I think, is hardly borne out by the evidence. To my mind, in this class of stone the angle of hack is a mere matter of indifference, as the object to be attained by the angled hack is that the mark on the grindstone should not strike the job so as to cause a "jump," but rather have a gradual wear of the part so hacked. To make this plainer, I show two rough sketches of what might be termed ideal marking of a stone, (1) where the diamond mark is wanted, (2) where the cross mark is wanted, both of which are used for heavy work. In No. 1, the apex of the

No. 1.



No. 2.

triangle formed by the hacks should just come to the base formed by line joining the extremities of the two hacks. In No. 2, the projection of the termination of one hack on the opposite side of stone should fall at that point where next hack begins. This in both cases gives the maximum efficiency of the stone. In stones where light work alone is done—as in this case—the angle of hack is immaterial, as the job may be held to the most efficient angle.

Re the alleged greater tendency to fracture produced by the parallel hack. This, I hold, is not the case. Practically, there is no difference; theoretically, there is *less* tendency to fracture by a parallel hack.

The cause or causes to which I attribute the accident are as follows:—

During the recent strike among the engineers the stone was standing in water for various periods, one of which extended over 14 days, others about a week. During that time there was always water in the trough. Result is, that at some period the part now broken had been left constantly in the water, and

thereby subjected not only to the possible influences of softening, especially the water getting into the coal reed, but also to the frost, which was especially severe about that time. Again, the speed was high. There is absolutely no need to go beyond 3,000 lineal feet per minute. This is the speed that I found most efficient.

During the evidence it was shown that this stone was only tested when brought into the shop, six months before date of accident. It is not a serious matter, testing a stone by means of tapping. Surely it could be done oftener than this. I would strongly urge that new stones, especially, be examined frequently and carefully.

ARCHIBALD NEWLANDS.

121, West Regent Street, Glasgow,
28th July 1893.

III.

LETTER FROM Mr. CHARLES HELLIWELL.

Hackenthorpe, Rotherham,
January 31, 1896.

Dear Sir,

When visiting the works here some time ago you spoke to me about grindstones, and I promised to send you some little account thereon. I enclose a few rough ideas herewith.

I am sorry I have overlooked the matter till now. It ought to have been seen to long ago.

I have had some talk with the grinders on these questions, but it is very difficult to get an opinion from them.

I would say that my employers have always been ready to provide any tools or tackle the grinders have suggested to promote safety, and they (Messrs. Thomas Staniforth & Co.), could show at any time about 100*l.* worth of grindstones which have been fixed, and found slightly defective, and at once taken out again, without doing any work of any kind.

I have been employed by the above-named firm nearly 22 years, and they have never objected to any expense which would increase the safety of the workmen.

Trusting you may not have been inconvenienced by this delay.

Yours, &c.
CHARLES HELLIWELL.

Commander H. P. Smith, R.N.,
H.M. Inspector of Factories.

Suggestions by Mr. Charles Helliwell.

All grindstones should be made from blocks as even in colour and grit as possible, and free from "raddles"—iron or coal streaks.

The stones ought to be sawn off the block at the quarry, and not blown or riven off with explosives.

Stones are frequently thrown down on their side at the quarry to facilitate "holeing," loading, &c., which practice is very objectionable, seeing that it starts a flaw or crack sometimes.

All stones should have round holes, about ½ inch larger than the shaft on which they have to work.

If grindstones were made a little thicker at the centre, so as to form a dovetail into the concave plates when fixed, they would be more safe when at work.

Stones should be carefully lifted off the waggon on unloading, and not dropped upon the face on the ground, which often crushes or even cracks them, and is seldom found out until the stone has been at work some time.

Grindstones should be stored under sheds, standing on iron plates to keep the bottom portion dry.

No stone should be hung or fixed, under any circumstances, without being first carefully "raced," or turned true on the sides, for the circular concave plates to fit to, and bear even all the way round before being screwed up tight ready for work.

When very thin stones are used, it is adviseable to insert a thin lining of wood, say ½-inch thick, made from best white deal or other wood, free from knots and even

in thickness, between each circular concave plate and the stone, which binds the stone more securely without crushing it when screwed up.

Stones should never on any account be fixed on wood wedges when running at full speed.

Grinders should be liable to a fine if they leave the stones standing in water all night after working them.

Some rule should be adopted as regards speed of grindstones when at work, and the men not allowed to exceed that speed without being liable to a fine.

Grindstones when well fixed, and are sound, may be run at about 4,000 feet circumferential speed per minute.

IV.

WRITTEN STATEMENT BY WITNESS B., AN EXPERIENCED GRINDER.

Health of Grinders.

That the condition under which grinders work is very prejudicial to health.

In the first place it is a cold and damp occupation, with continual draughts, as in many instances there are no windows to the hulls, even in the lighter branches. In the heavier branches it is not so desirable, as it is a means of carrying away the dust, &c., which is continually being made, therefore we have to accept the exposure to the cold and damp weather in preference to inhaling the amount of dust, &c., which arises from our industry.

There are other causes, and one to which I have given a little study is, that when pressing the article on the stone, wet, it becomes very warm, and in taking it off to see how it is going on a vapour arises from it which is inhaled by the person. In this vapour there is a certain amount of carbon and other ingredients of which the article is composed, to inhale which must, to my mind, be very prejucial to health. But this, I am sorry to say, can scarcely be avoided.

Manufacture of Grindstones.

That every quarry owner or maker of grindstones shall be compelled to make them free from cracks, shuts, and also wants in the face and sides, so as to enable the grinders to firmly bed the plates to them.

If any of these defects appear after being delivered, the expense of the stone and transit shall fall on the quarry owner, as in nine cases out of ten they know of these defects before leaving the quarries.

In my opinion, if the above were rigidly carried out it would reduce the accidents materially.

V.

"SHEFFIELD DAILY TELEGRAPH," SATURDAY, NOVEMBER 13, 1897.

Sheffield Trades Council.

The Question of Grindstones.

A monthly meeting of the Sheffield Trades Council was held last night, Mr. Charles Hobson presiding. The file hardeners were admitted to membership.

The following resolution was carried unanimously: "That this Council enters its "strong protest against the action of the Home Secretary in his decision as to "grindstones continuing to be run in front or close to the front of fireplaces. We "would point out that this will mean the continuation of the present dangerous "system, by which in the past many accidents to workmen have occurred, often "resulting in loss of life. We would urge that the whole question be re-opened, and "that Government be requested to send down an inspector to inquire into and take "evidence, and that steps be taken to give effect to this resolution."

SUMMARY OF THE EVIDENCE TAKEN BY THE DANGEROUS TRADES COMMITTEE.

GRINDSTONES.

SHEFFIELD.

Mr. F. J. Parkes, H.M. Inspector of Factories.—In evidence, dwelt on necessity of testing stones at the quarry. Confirmed views on running stones in front of doors, passages, or fireplaces. Gave written statement printed in Appendix XI.

G. Robinson.—Recommends grindstones be fitted with round holes and convex plates. Submitted model. Witnesses afterwards examined considered it impracticable.

Mr. Dodgson, H.M. Inspector of Factories.—Recommends the use of round holes. Is opposed to the testing of stones at the quarry. Gave written statement printed in Appendix XIII.

Evidence given by two Representative Grinders, A. and B.

The Chairman.—Will you give us your views as to how accidents through flying stones could be avoided?

A.—A frequent cause is "overspeeding." Sometimes this is brought about by the engine running too fast, or by the pulley being too small. For a 3-feet drum of 150 revolutions per minute the pulley should be half the height of the stone, where the stone is soft, such as come from Thrybergh and Silverwood. For "whittening" stones, which are much harder and will allow of running at a greater speed, $2\frac{1}{2}$ inches under the half-height would be sufficient. The 3-feet drum is the average drum in Sheffield.

Captain Smith.—It would be difficult to fix a hard and fast line for pulleys?

B.—Yes. The rule of "4-feet stone, 2-feet pulley," will do for one stone and not for another. It is hard to give a universal rule for speed.

A.—Another cause of stones flying is their being allowed to stand in water when not running. This makes the immersed portion heavier than the portion outstanding, and makes it pull away from the lighter part when set in motion.

Stones being fastened on to the axle with wedges instead of plates is not now the custom so much as formerly. No one should be allowed to run a stone over 14 inches diameter in wedges.

Witness had come to these conclusions after very careful consideration along with the representatives of the grinding trades in Sheffield—and this included the evidence of the trade which is more affected than any other—the razor-grinding trade.

Defective bedding-plates. The plates are packed on the stone, and screwed up. The stone is laid down to put the plate on. Sometimes the stone is nipped in one place and not touched in another. The safest and best plan is for the stones to be "raced" for the plates, and then you get a uniform surface.

B.—The best preventive is the proper bedding of the plates. All stones should be properly bedded, so that the plate touches the stone evenly at all points. He did not recommend "racing" for the plates.

A.—The position of the hole for the axle is important. It should be perfectly in the centre. Sometimes this is not so when the stone comes from the quarry. (*A wood model was here shown.*)

B.—Round holes are safest, but that would prevent the razor-grinders from using the stones they now use.

A.—The question of the razor-grinders could soon be got over.

Some defect in the stone before using, such as holes in the side, shots, or cracks. The workman at the quarry can tell whether the stone is right or not. If quarrymen were paid by the day instead of by the piece, more good stones would come from the quarry. Piece-work is the common custom at the quarries.

The quarry owner or stone merchant should be made responsible for the stones. When he (witness) got a new stone from the quarry he used never to pay for it until after he had used it for some months, and he always got redress for bad stones. It seems the practice for the quarry owner to shirk responsibility after the stone is delivered, and he even states his non-liability on his printed forms.

B.—Three days would be ample time in which to determine the soundness of a stone.

A.—Stones should not be re-dressed to work out a crack. You can never tell where a crack stops.

A committee of experts should examine doubtful stones. Sometimes a man will run a doubtful stone, not only to the danger of his own life, but also of every one who is within range of the stone. Complaint should be made to the Inspector of Factories, he to call the committee of experts, and their opinion to be binding. A committee of three would be sufficient, and they should be chosen by the Inspector who called them together. The committee to have absolute power to stop the stone until the matter has been decided upon.

The Chairman suggested that the occupier should choose one member of the committee of experts, and the workman another.

A.—There should be improved floors. They should be concrete, flagged, or asphalted.

There should be some arrangement of hot pipes to warm the hulls.

Some method should be adopted to obviate draughts.

B.—I adhere to the statements I have made elsewhere as to the danger of running stones before a door or fireplace.

C., 65 *Years of Age*, 45 *Years a Grinder.*—In scissor-grinding you begin dry and finish wet. Has his own tools, sometimes has three or four men under him. Has found dust worse than damp. Fans came into use 40 years ago. Provides his own. Would classify the dangers of using grindstones under five heads:—

1. Faulty making and re-dressing.
2. Inefficient storage.
3. Imperfect hanging.
4. Overspeeding.
5. Careless using.

1. Most cases come under the first head. The makers at the quarry, being piece-workers, try to hide a flaw or crack if they can. The quarryman ought to be paid for the work he has done, whether there is a flaw in the stone or not. Thinks that the quarrymen in 9 cases out of 10 know the cause of the breaking of the stone. Even the grinders will often take the risk and work with a defective stone in the hope that it will not fly. Re-dressing is a very bad practice. They take the flaw out and make the stone look new. They ought to sell the stone as re-dressed, not as a new one. 2. Under the second head, stones are left exposed to the weather in the store, both at the quarry, at the merchant's, and at the grinder's. The stone absorbs moisture at the bottom, and, if heavier at one end, bumps and breaks. 3. Imperfect bedding of the plates acts so that the side surface of the stone is not even. The pressure put on cracks it. Many sickle-grinders' stones are thus cracked. 4. If the stone is softer than the grinder requires, he runs it faster in order to get the work out of it. The softer it is, the more liable to fly with overspeeding. 5. If the stone be left all night with its lower part resting in water, and there should be a fire in the shop to which the top part is exposed, the stone gets out of balance. It bumps and breaks. Handed in a price list from the merchants showing they will not be responsible for cracks or flaws. Witness feels very strongly on re-dressing. Would make it a criminal offence to re-dress a stone and sell it as new. Would suggest that where the efficiency of a stone is disputed between employer and workman, each side should choose a man, and these two should decide whether the stone should be hung or not. Thinks there ought to be an alley of 5 feet in width between two stones and in front of the fire, in which no grindstone should be placed, even though the fireplace might be only 18 inches wide.

D., *Grindstone Merchant.*—Statistics as to stones in relation to accidents. Between January 1st, 1894, and November 24th, 1897, he sent off 11,978 stones. These vary in diameter from 3 feet to 7 feet 6 inches. Of these 14 flew:

2 in 1894 out of 2,874 stones.
1 „ 1895 „ 2,741 „
3 „ 1896 „ 3,244 „
8 „ 1897 „ 3,029 „

Rougkly, 10,500 of these stones were used in Sheffield, and the breakages were all in Sheffield. No flaw could be found in these stones, after breaking. Out of 8 this year 3 flew in February in a thaw, 1 after a fortnight's use, another after only a few hours. All three were raced at the quarry, and no flaw was found in them. They race them at the quarry as a saving of labour. A man can race three in the time he would trim one by a tool. Thinks racing at the quarry a mistake,

because a grinder can tell better if there be a flaw or anything wrong with the stone when it is in the water. Thinks that many stones fly by being holed by grinders. Recommends that all stones should be holed at the quarry. The harder the steel to be ground is, the softer ought the stone to be. Recommends that all quarry work should be time work. Thinks all holes should be round. No stone over 12 inches in diameter should be hung with wedges. Thinks there are from 10,000 to 12,000 stones used in Sheffield in a year. 5,000 stones run in Sheffield every day, not counting the "pen and pocket" stones. In Lancashire, Birmingham, &c., they are not run so fast. Thinks stones should be kept. Grinders have to bed their plates according to the width of the trough or length of the axle.

E., Partner in a Cutlery Firm.—Recommends racing at the wheel, not at the quarry. Considers that the dressing of stones by hand must be better than sawing them. Witness took exception to the methods of the Committee in seeking to obtain information. The witness declined to accede to the Committee's request that the short-hand notes of his evidence should be published in full.

REDDITCH.

Mr. W. E. Compton, Proprietor of the Firm of Arthur James, Needle and Fish-hook Works, Redditch.—For 30 years a test has been carried on at the works, not at the quarry. Only had one breakage of a stone in use; that occurred 8 or 10 years ago. Stones are tested up to 1,500 revolutions per minute, and run at 1,200 revolutions. A certain number of stones have flown during test. Considers testing absolutely necessary. Not more than one stone a year flown in test. They get through about 50 stones a year. The stones are raced here, not at the quarry. They come from a quarry near Sheffield. Messrs. Gillot, Fox Hill quarries, supply them.

Mr. Blundell, Warehouseman, William Hall & Co., Studley.—Stones vary from 5 inches to 32 inches in diameter. 100 stones used in a year—all tested. Only remembers one broken in the test, and that three weeks or a month ago. Had none broken in use. Test conducted at 1,140 revolutions per minute. Stones are run at 890 revolutions.

Mr. Webb, Foreman, H. Millward and Sons, Redditch.—No stone run without a test. Stones are fitted with round holes and plates. Thinks green stones—*i.e.*, fresh from the quarry—should not be used. The test conducted at 2,000 revolutions per minute; run at 1,500 revolutions.

Mr. Peter Lancé, Manufacturer, Redditch.—Has tested stones for the last 15 years. Uses about 250 stones per annum. In five years, four stones broke in the test. Since testing, no stone broken in use. Before testing, 10 to 15 stones flew in 10 years.

BIRMINGHAM.

Mr. A. N. Sage, Partner in A. W. Wills and Son, Birmingham.—All stones tested. During test, men on either side are sent away, leaving a clear space of 10 feet on either side. Test conducted at same speed to be afterwards used. Horsing chains are supplied by Messrs. N. Hingley and Sons, and are certified as having passed Government test. Horsing is of solid oak, 3 feet 6 inches long by 21 inches wide by 18 inches deep. No back chains used. Stones should not be run in front of fireplace; thinks this would be very dangerous. Thinks stones should be weathered before use. Believes flaws would then be more easy to detect. Stones should not rest in water, but on an inclined plane, or on gravel.

Note.—At the works—Park Mills—the Committee observed the pulleys were 5 inches above the half-height of the stone; large heavy stones are used. They run at 140 revolutions per minute. Wedges are used, though some of the men said they preferred plates. Stones before use are run in water for two hours. At the San Paulo works of the same firm, a stone had flown the day before the Committee's visit. No injury was caused to any person. Its flight was arrested by a solid wall in front. The fireplace was at the back. The fire was also in this position at the works of Mr. A. F. Parkes, Dartmouth Street, and at Yates' Mill, belonging to Mr. D. Raines. At both of these places, the thick wall in front and the absence of a passage seemed an excellent arrangement. Wedges are used at Mr. Raines's. When the stones are first put in at Mr. Parkes's, they are 6 feet in diameter. The spindle runs at 200 revolutions per minute, giving a surface velocity of 3,600 feet per minute.

F.—Thinks there is no reliable test for all stones by which all flaws could be detected. Stones are, as a rule, only raced as far down from the circumference as they are going to be used. The crack may originate in the part unraced, and

generally does so. Red stones are the most dangerous. Wedges tend to widen a crack. A stone with a crack may run until the surface is worn down to a point near enough the crack to cause the fracture of the stone. Suggests the smoke test for the detection of any cracks which appear upon any outer surface. Recommends that a stone should run in its hole for at least one hour before the grinder gets on to his horsing. It should run in water at the same pace it has to be run after. Thinks chains rust and rot, and should be inspected either by workmen or employer. Suggests every stone should be replaced in 5 years. No fireplace should be in front of a stone. The horsing should be of oak and of sufficient size and weight, not less than 2 cwt. Thinks "horses' tails" should be abolished, and replaced by an iron bar, 2 inches square, stuck into a socket in the earth about 6 inches. This is in use at Messrs. Moles's, in Birmingham. Says they always have an epidemic of breakages after a frost. Thinks stones should be kept under cover. Maintains there should be a space of 2 yards from the back of the horsing to the wall, and a space of 7 yards from the back of the stone to the wall *in front* of the grinder. There should be no steampipes or boiler in front of the grinder. The witness spoke of the part furthest removed from the grinder as the back of the stone.

G.—Has had 25 years' experience of steel and edge tools. Considers plates should be used instead of wedges, down to a 24-inch stone. Recommends round holes. Stones should be kept under cover, otherwise there is a tendency towards the production of a heavy side. Chains will last 5 years, but they should be changed after that. Thinks stones ought to be run half-an-hour before anyone works at them. There is great need for improvement of ventilation in grinding shops. It is very bad now.

FILE CUTTING.

The evidence on file cutting includes :—

I. A return of cases of illness amongst file cutters in the "Pride of Wadsley Bridge" Lodge, Order of Druids, showing the amount of sick pay received and the number of days of illness.

II. Written statement by Dr. Henry Harvey Littlejohn, formerly Medical Officer of Health for Sheffield.

III. Written statement by Dr. William Smith Porter, Physician to the Royal Infirmary, Sheffield.

IV. Letter to the Chairman from Mr. Charles Hobson, J.P., President of the Federated Trades Council, Sheffield.

V. Written statement by Mr. Stuart Uttley, J.P., Secretary of the Federated Trades Council, Sheffield.

SUPPLEMENTARY EVIDENCE.

VI. Return of cases of lead poisoning among file cutters July 1898 to June 1899—reported in Sheffield only.

VII. Letter from Dr. S. M. Inkster, Certifying Surgeon for Sheffield.

VIII. Letter from Dr. C. N. Gwynne, Certifying Surgeon for Sheffield.

IX. Extracts from a lecture by Dr. Sinclair White, formerly Medical Officer of Health for Sheffield.

X. Analysis of dust from two file cutting shops by Professor Thorpe, F.R.S.

I.

HEALTH OF FILE CUTTERS.

STATEMENT HANDED TO THE DANGEROUS TRADES COMMITTEE.

"PRIDE OF WADSLEY BRIDGE" LODGE.—I. ORDER OF DRUIDS.

No. of file cutters in Lodge			24
„ „ „ having received sick pay			8
	£	*s.*	*d.*
Amount of sick pay received by file cutters	21	18	0
Average pay received per member (file cutters)	0	18	0

The above figures are since the Lodge was formed, 6½ years ago.

SICK PAY AND SURGEON'S NOTES.

Member's Name.	Days sick.		Cause of Illness.
	Weeks.	Days.	
A. Holmes	5	2	Catarrh.
"			Rheumatism.
"			Inflammation of jaw-bone.
"			Tonsilitis.
John Fearn	8	0	Erysipelas.
William Fearn	1	0	Catarrh.
George Fearn	7	1	Influenza.
"			Catarrh.
J. W. Fearn	1	0	Lumbago.
William Unwin	7	2	Diarrhœa.
"			Rheumatism.
"			Debility after rheumatism.
John Unwin	5	0	Injury to back.
"			Finger bite.
Manville Unwin	1	2	Abscess.
"			Acute tonsilitis.
Total time sick	36	1	

This Report clearly shows that not in any of the cases of illness was unhealthiness of their trade the cause.

II.

REPORT BY DR. H. HARVEY LITTLEJOHN, FORMERLY MEDICAL OFFICER OF HEALTH FOR SHEFFIELD.

The injury to health from the manufacture of files arises chiefly from lead poisoning. A large number of those engaged in the trade, show a well marked blue line on the gums, and many of them have suffered from more serious symptoms, and have been under treatment in the hospitals. Not a few have suffered from severe lead poisoning several times, and after recovery, more or less complete, have again resumed work at their trade.

Speaking generally, I should say that file makers as a body show evidence of impaired nutrition and health, and in my experience it is exceptional to find a robust file cutter. I do not mean that they all complain of any special form of ill-health, but they are for the most part sallow, poorly nourished, and deficient in muscular development.

The causes of this are not far to seek. The trade of file cutting may be said to be carried on under three conditions:

1. Machine file cutting, and file cutting as carried on in some of the larger works, where the workshops are, upon the whole, well constructed, and where there is sufficient cubic space.
2. The cutting by "small masters" or individual workers, who carry on their trade in small poorly constructed outhouses, ill adapted for the purpose, in which the cubic space is deficient, and where there is no proper ventilation.
3. File cutting in the houses of the workpeople.

In the first class the work is carried on under conditions to which exception cannot well be taken on the ground of deficient cubic space, and the workrooms compare favourably with those of other trades of a similar nature.

In the second class, on the other hand, the workshops as a rule are very small, low in the roof, and so constructed that efficient ventilation is practically impossible. Most of these shops are of such a rude and primitive description that they appear not to have been built for the purpose, and to have been simply outhouses in the yards belonging to dwelling houses, which in the absence of control and official restrictions have been transformed into shops for file cutting.

They are frequently built against a blank wall, with a "shed" or sloping roof, so that *through* ventilation is impossible, and all light and air is admitted by windows, which are situated low down, and immediately in front of the bench at which work is

carried on. Under these circumstances, when the windows are opened the cold air blows directly upon the workpeople, and cannot be borne except during hot weather.

Fireplaces are present in some of these shops, but when not in use the chimney is generally closed up, so as to prevent ventilation by this means.

The floors often consist merely of earth, or bricks loosely laid, and are frequently damp and foul from the accumulation of dust and other refuse.

These shops are as a rule bitterly cold in winter, and I have frequently been told by workpeople that the only way to make the temperature at all bearable is to block up every opening to the outer air, and to have as many workpeople in them as possible.

In most of the shops the cubic space is now just sufficient to meet the requirements of the law, viz., 250 cubic feet, while a few years ago they were, as a rule, overcrowded to a much greater extent.

Owing to the large number of these workshops scattered all over Sheffield, and the fact that in many instances several independent file makers may be working in the one shop, while also the amount of work each has to do varies from week to week, thus entailing irregular attendance in the workshop, it is exceedingly difficult to prevent overcrowding and ensure observance of the official requirements in this respect.

The *third class* are the home workers, and for the most part these consist of women who, before marriage, have learnt the trade, and who afterwards, to assist in obtaining a livelihood, continue to carry on the trade in the intervals of their domestic duties. Whatever evils and risks there may be in connection with the trade, these are accentuated in the case of "home" workers, since the class of person thus engaged is generally reduced by poverty, and occupies a house of the poorest description, while there is neither the means nor the will necessary to secure proper cleanliness, with the result that ill-health generally ensues. Under such circumstances lead-poisoning is a risk to which not only the parent is exposed, but the other members of the family as well.

The chief causes of the prevalence of lead poisoning among file cutters, are (1) the dust which is generated from the lead cushion used to rest the file upon; and (2) the soiling of the hands, especially the left, from contact with the cushion.

I have proved the constant presence of lead in the dust of such workshops, and for this purpose made experiments, taking samples of the dust from the floors, the benches at which work is carried on, and from the rafters or projections in the shop at a level above the heads of the workers. In every case I was able to demonstrate the presence of lead, in a more or less finely divided state, and in considerable quantity.

This proves, what has often been stated, that lead is given off from the cushion during the process of cutting the files, and that it forms one of the suspended impurities in the air of such places.

Lead can therefore readily find access to the system through the lungs from this source, and may be even a more potent cause of lead poisoning than direct conveyance of the lead into the system by means of the hands. The fact of lead being found in dust near the roof or ceiling proves that it must be given off in a finely divided state, and also that efficient ventilation would largely diminish its presence as a permanent impurity in the air of the workshop.

As I have already pointed out, means of ventilation (apart from windows, and, in some cases, of chimneys), are absent, and hence the impurities in the air of such workshops tend to rise to the ceiling, where they stagnate, the suspended matters being deposited as dust on the floors, rafters, or other exposed surfaces.

Owing to the faulty constitution of the majority of existing file cutting shops, their ventilation offers great practical difficulties in the absence of any means of warming the incoming fresh air, but I am strongly of opinion that if the work could be carried on in a pure atmosphere, much of the danger of lead poisoning would disappear.

The second great source of the introduction of lead into the system is the contamination of the hands with lead and the neglect of cleanliness. The workpeople do not, as a rule, realise the danger of this want of cleanliness, and a cause which without doubt conduces to lead poisoning is the taking of meals in the workshop, and the absence of any facilities for washing in connection with the workshops. No doubt, some of the workpeople live in adjacent houses, and take their meals at home, but others again live some distance away, and as there is no water supply attached to the workshop, they are unable to cleanse their hands before taking the meals which are brought to them.

Even when they return home to dinner, I fear the practice of cleanliness is often disregarded, and that it can only be secured by having the necessary means for washing provided in connection with each shop, and by insisting that all workers shall wash their hands before leaving the premises or partaking of food.

In connection with the mortality statistics of file cutters, I give a list of all the deaths recorded in Sheffield from plumbism or lead poisoning during the last 12 years, together with the age and the sex of each person.

From this table it will be seen that out of 91 deaths registered as having occurred from plumbism amongst males and females during the 12 years, no fewer than 56 were file cutters by trade. This large proportion indicates the relative prevalency of lead poisoning amongst file cutters as compared with other trades associated with the use of lead, and also with lead poisoning generally amongst the whole population. That the figures represent the total number of deaths which were directly or indirectly caused by lead poisoning I do not believe, since from the nature and progress of the symptoms it must be evident that many deaths primarily due to lead poisoning would, in the absence of a regular medical attendant, be liable to be ascribed to secondary and dependent diseases.

In the second table I have given the number of deaths registered as having occurred amongst file cutters during the 12 years 1885–1896 from various causes. I am aware of the difficulties of obtaining accurate statistics of the mortality in different trades, but on the whole I think that these figures may be taken as fairly trustworthy.

I was unable to obtain the actual number of file cutters employed each year, and have therefore taken the number returned at the census of 1891, and presumed that this was the mean number engaged in the trade during the period under consideration.

In another column the general death rate is shown above 15 years of age from the same causes. By excluding the deaths below this age, I think we obtain a fairly unobjectionable means of comparing the mortality incident to the file cutting trade with the general mortality of the population. It is necessary to mention, however, that only male deaths are recorded amongst the file cutters, whereas the death rate of the general population includes both males and females.

In the last column is shown the percentage of deaths amongst file cutters to those of the general population above 15 years of age.

It will be noticed that, with the single exception of the digestive system, the death rate is considerably higher from the other causes than amongst the general population, the most marked difference being in the affections of the urinary system, which caused the death of 293 file cutters as compared with 100 amongst the general population. Nervous diseases and phthisis also show a marked difference in the mortality from these affections, while the *general* death rate is 19·68 per 1,000 in the case of file cutters as compared with 14·96 amongst all classes.

In conclusion, I would suggest, with a view to diminishing the danger of lead poisoning, and improving the health of workers at this trade: 1st, the necessity for efficient ventilation, and a larger cubic space in the workshops. 2nd, the provision, in connection with all such workshops, of means for washing the hands. 3rd, the prohibition of file cutting in dwelling houses.

It might be advisable also to insist on the workpeople wearing special clothes or coverings while engaged at work; but probably the difficulty of effecting such a precautionary measure would prove insuperable in its practical application.

TABLE I.

DEATHS in SHEFFIELD from LEAD POISONING for Period of Twelve Years 1885–96, supplied by DR. LITTLEJOHN, formerly Medical Officer of Health for Sheffield.

Cause of Death.	Sex.	Age.	Occupation.
1885:—			
Plumbism, lead colic	M.	36	File cutter.
Lead colic, plumbism, epilepsy	M.	22	Cutler.
Plumbism, apoplexy, asphyxia	F.	51	General servant.
Plumbism, Bright's disease	M.	32	File cutter.
1886:—			
Plumbism, pneumonia	M.	51	Brass turner.
Plumbism, convulsions, paralysis	M.	37	File cutter.
Lead colic, cardiac, drinking Redmires water	M.	75	Builder.
Lead poisoning, syncope, drinking Redmires water	M.	42	Book-keeper.

TABLE I.—*continued.*

Cause of Death.	Sex.	Age.	Occupation.
1886—*continued.*			
Plumbism, bronchitis	M.	42	File cutter.
Plumbism, apoplexy, lead colic, epileptic fits	M.	41	,,
Lead colic, epileptic fits, plumbism	M.	39	,,
Lead poisoning, paralysis	M.	25	,,
Lead palsy, plumbism	M.	35	,,
Chronic lead poisoning	M.	42	,,
Chronic lead poisoning, plumbism	M.	46	,,
1887:—			
Plumbism, paralysis	F.	22	Lead worker.
Plumbism, pneumonia	F.	29	Unknown.
Lead poisoning, colic	M.	42	File cutter.
1888:—			
Cardiac disease, plumbism	F.	57	Wife of accountant
Plumbism	F.	19	Lead carrier.
Lead poisoning, epilepsy	M.	45	File cutter.
Plumbism, albumenuria	M.	12	Son of joiner.
Plumbism, epileptic fit	M.	24	File cutter.
Plumbism, broncho-pneumonia	M.	66	Razor grinder.
Plumbism	M.	37	Plumber.
Lead poisoning, chronic kidney disease, uraemia	M.	39	Cutler.
Asthenia, plumbism	M.	64	File cutter.
Plumbism	M.	37	,,
Lead poisoning, effusion on brain	M.	53	,,
Chronic plumbism, apoplexy	M.	57	,,
Plumbism, uraemia	M.	48	,,
Plumbism, morbus cordis	F.	24	Unknown.
Epileptiform convulsions, lead poisoning	M.	27	Labourer.
Chronic plumbism	M.	49	Saw maker.
1889:—			
Plumbism, chronic Bright's disease	M.	39	File cutter.
Lead poisoning, painter's cholic, asthenia	M.	37	Painter.
Plumbism, bronchitis, exhaustion	M.	52	File cutter.
Plumbism	F.	21	No occupation.
Plumbism	M.	45	File cutter.
Lead colic, liver disease	M.	49	,,
Plumbism, syncope	M.	51	Painter.
Bright's disease, plumbism	M.	25	File cutter.
Chronic nephritis, plumbism	M.	42	,,
1890:—			
Lead poisoning, Bright's disease	F.	38	Lead mill hand.
Plumbism, albumenuria	F.	39	Wife of grinder.
Plumbism, epilepsy	F.	16	Daughter of porter.
Plumbism, nephritis	M.	56	File cutter.
Plumbism, disease of kidneys	M.	39	,,
Lead poisoning	M.	53	,,
Plumbism, paralysis	F.	50	Wife of policeman.
1891:—			
Plumbism, Bright's disease	M.	60	File cutter.
Lead poisoning	F.	46	Lead worker.
Plumbism, morbus cordis, convulsions	M.	49	File cutter.
Plumbism, anæmia, syncope	F.	35	,,
Lead poisoning, epileptiform convulsions	F.	24	Lead worker.
Lead poisoning, convulsions, coma	F.	40	Unknown.
Plumbism, apoplexy	M.	46	File cutter.
Lead poisoning, rheumatism, dropsy	M.	43	,,
Chronic lead poisoning	M.	30	?
Lead poisoning, kidney disease	M.	44	File cutter.
1892:—			
Chronic plumbism, pneumonia	M.	50	File cutter.
Plumbism	M.	43	Table-knife hafter.
Plumbism, apoplexy	M.	39	File cutter.
Plumbism, uraemia	M.	64	,,
Lead poisoning, Bright's disease	M.	46	,,
Paralysis, plumbism	M.	45	Lead mill worker.
Epilepsy through lead poisoning	F.	18	,, ,,
Lead poisoning	M.	34	File cutter.

TABLE I.—*continued.*

Cause of Death.	Sex.	Age.	Occupation.
1893 :—			
Plumbism, Bright's disease	M.	33	File cutter.
Plumbism, chronic nephritis, uraemia	F.	43	„
Plumbism, nephritis	M.	52	Metal smith.
Plumbism, chronic Bright's disease, uraemia	M.	33	File cutter.
Plumbism, purpura hæmorrhage	M.	38	File hardener.
Plumbism, morbus cordis, dropsy	M.	34	File cutter.
1894 :—			
Plumbism, epilepsy, convulsions	M.	30	Table-knife hafter.
Lead poisoning, softening of brain	M.	61	File cutter.
Plumbism, cerebral disease	M.	34	„
Plumbism	M.	46	„
Lead colic, syncope	M.	52	„
Plumbism, cerebral atrophy	F.	32	„
Plumbism, paralysis	M.	41	„
Plumbism, lead poisoning, rheumatic fever	M.	47	Plumber.
Plumbism, phthisis	M.	35	File cutter.
1895 :—			
Lead poisoning	M.	50	File cutter.
Lead poisoning, ascitis	M.	31	„
Plumbism	M.	52	„
Plumbism, morbus cardis	M.	47	„
Plumbism, enteritis, exhaustion	M.	53	„
1896 :—			
Plumbism, paralysis	M.	22	File cutter.
Plumbism, asthenia	M.	49	„
Plumbism, epilepsy	M.	32	„ (machine).

TABLE II.

DEATHS and DEATH RATES from various causes among FILE CUTTERS (males) and amongst the General Population between 15–75 years of age for the years 1885–1896.

Diseases.	File Cutters.		Death Rate per 1,000 of Population, 15–75 years of Age.	Percentage of Deaths among File Cutters to Total Deaths.
	Total Deaths 12 years.	Death Rate per 1,000.		
Nervous System	161	2·97	1·76	164
Respiratory System	245	4·52	3·63	124
Phthisis	193	3·58	2·32	154
Urinary System	86	1·59	·54	293
Circulatory System	105	1·93	1·85	104
Digestive System	21	·38	·89	42
Liver	16	·29	3·97	120
Other Causes	238	4·39		
All Causes	1,065	19·68	14·96	131

III.

REPORT ON LEAD POISONING; BY DR. WILLIAM SMITH PORTER, PHYSICIAN TO THE ROYAL INFIRMARY, SHEFFIELD.

Some years ago I made a special study of lead poisoning, both in connection with manufactures and with other sources of poisoning. In a number of years, from 1880 to 1886, I kept statistics of all the cases of lead poisoning I came across; but I have not done so for the last 10 years. In 1886, at the request of Dr. Sinclair White, who was then Medical Officer of Health for Sheffield, I embodied the results of my observations in the form of a letter, to be included in his annual report, but this was rejected by the Health Committee at the time. Without troubling you with figures which relate to a period so far back, I may say that my experience of this disease among file cutters is that it pursues a very insidious course in most cases. Specific symptoms of poisoning do not occur, among the male workers at all events,

for 13 or 14 years very often. That was the average of time, I found from my statistics, between the date when the first exposure to the poison occurred and the first specific symptoms causing them to seek medical advice. When they did come under observation with symptoms such as colic or paralysis, the mischief was done. In girls I have found a decided exception to this rule, the effects of lead poisoning often appearing quite early in the course of their work as file cutters. Besides the specific symptoms of poisoning, however, file cutters seek medical advice at an earlier stage often for chronic dyspepsia and constipation, and then show the blue line on their gums, and often well marked signs of lead cachexy, such as sallowness or anæmia, and muscular tremulousness perhaps. I believe that the general health is undermined to a very serious extent often before the case is treated as one of definite lead poisoning; and that from this cause other diseases are induced, and that the recorded mortality from lead poisoning among file cutters does not at all represent the true state of the case. In file cutters the form of poisoning is very chronic and insidious, and therefore all the more dangerous and difficult to deal with. Many cases of consumption and kidney disease in Sheffield have their origin in lead poisoning, but do not show this in the mortality returns.

As to the channel by which the poison gains admission to the blood, this, I believe, is principally by the mouth and nose, though to a slighter extent through the skin. It gets in by the nose and mouth in breathing, and by the mouth with food or drink taken in the workshop, or by the trick of licking the forefinger and thumb of the left hand, or chisel hand, which file cutters have. The lead dust is carried out of the workshop, too, in the clothing, and may thus find its way subsequently into utensils used for eating and drinking. The workers, too, who take their food out of the workshop, forget to wash themselves before doing so. When I was paying special attention to this subject I visited several workshops, and saw all the conditions for myself. I asked if any lavatory accommodation was provided, or any warning notice put up in the workshops advocating cleanliness and the observance of preventive measures. There was then nothing of the kind. If there was any lavatory accommodation, it was of the most primitive and ineffectual character. I was told that warnings and notices would be utterly disregarded by the men themselves.

With regard to the number of file cutters who take their work home, probably the conditions are worse; and it would be more difficult with them to secure the adoption of any preventive measures. The insidious nature of the disease in file cutters is of itself an obstacle. In white lead factories they have more object lessons, from the acuteness of the symptoms in many cases, to impress upon them the necessity for caution.

IV.

LETTER FROM COUNCILLOR CHARLES HOBSON, J.P., PRESIDENT OF THE FEDERATED TRADES COUNCIL, SHEFFIELD.

Acorn Villa, Alpine Road, Sheffield,
27th November 1897.

DEAR MR. TENNANT,

AFTER our friendly talk this morning I thought it would help to a clearer understanding of my views on the points you were good enough to elicit my opinions upon if I penned them just as they occur to me.

1. Home work should be discouraged, and also what is known as domestic or private workshops, as proper supervision and control is impossible, and all legislation should go in the direction of factory work, where all the operations of labour could be directly and readily directed and controlled.

2. In file cutting shops a larger air-space should be allowed, and the stiddies should be further apart, to prevent the inhaling of lead dust constantly rising from the stiddy-face, or such as is brushed from the file when cut.

3. Special attention should be paid to cleanliness, similar to the regulations enforced in lead mills, or certainly such as will prevent food coming in contact with lead dust or the unwashed hands of the file cutter. Ample provision should be made for frequent washing, which should be rigorously enforced; also provision made for dining out of the workshop.

By way of attaining the above reforms, I suggest the following :—

A. Limitation of working hours by law in such trades as are considered dangerous or injurious to health, and that juniors and females be allowed to work a given number of hours during the day time, and on no account during the night.

B. Employers should find all tools and working material.

C. They should be required to provide workshops, and no deductions from wages should be allowed either for material, tools, gas, shop room or any other thing.

This reform would make it to the advantage of the employer to have his workpeople on his firm, and under proper conditions.

D. The Department should issue a request to all Sanitary Authorities to appoint Special Inspectors for Factories and Workshops, and require a systematic visitation and report on a thoroughly up-to-date schedule covering all the needs of the case.

If above suggestions are thought at present impracticable, as an alternative I suggest that all domestic workshops should be put upon a thorough health basis as to air space, working room, w.c. accommodation, light, &c., and the rest will come in due course.

Yours, &c.
CHARLES HOBSON.

V.

REPORT ON THE SICKNESS EXPERIENCE OF THE SOCIETY OF FILE CUTTERS BY HAND IN SHEFFIELD, BY COUNCILLOR STUART UTTLEY, J.P., SECRETARY OF THE FEDERATED TRADES COUNCIL, SHEFFIELD.

Please to note that although we have no sick benefit attached to the society, yet we have a system of exempting members from payment of contribution during sickness, which enables us to ascertain correctly the experience. Further, that in getting out the experience I have dealt with adult males working within the city boundary only, as they were the most likely to afford me the most reliable data as to average health in the trade.

The years 1891 and 1896 have been selected in consequence of both years being periods of good trade, and consequently there was less inducement for malingering.

In 1891, out of 1,092 members of the union who worked in the city there were claims made for exemptions on account of sickness amounting to 1,109 weeks, or a fraction over one week per man per annum.

In getting out these particulars, I noticed that at one firm employing 22 men the weeks of sickness amounted to 45, which was largely in excess of the average. On investigation I found that one man over 60 years of age had claimed 25 weeks sick, and two others 6 and 7 weeks respectively. In another case, 26 men have 62 weeks exemption for sickness credited to them, and I find that the men employed are notably an unsteady class, and in my opinion a large number of these claims for exemption were made in order to evade payment of contribution after a week's "spree." Thirty-eight men employed at another firm had claimed 82 weeks exemption on account of sickness, which I found was made up as follows:—One aged man (65) had claimed 15 weeks; he suffered from rheumatism and bronchitis. Two others, aged, claimed 13 weeks each, and one man had been in the asylum 27 weeks, which brought the natural sickness to the normal condition.

In 1896, 961 men working within the city area claimed 951 weeks' exemption from payment of contribution on account of sickness, or a fraction under one week each per man per year. As in 1891, trade was good, and all were in employment.

It will no doubt be said that the above statement does not accord with medical experience. Possibly not. But I do not find the difficulty in reconciling the two positions which some people might, and am prepared to give my reasons.

After careful study of the subject, I am fully confirmed in my opinion that a great deal of the ill health of file cutters (by hand) is the result of their neglect of the most ordinary sanitary precautions and the lack of personal cleanliness. In many cases a good bath is almost unknown. The following will illustrate the position. It is reported that two workmen had a trip to the seaside, and were induced to bathe. When in the water, one said to the other: "Jack, thou art black!" Jack replied, "Aye, I never come last year."

Also the wearing of clothing until it becomes saturated with grease and lead dust. An apron is never worn, and in many cases the same garments are used for extra bed covering, and in some cases worn every day, Sunday included.

I desire it to be clearly understood that the men referred to are a class of men who form the substratum, and who seldom, if ever, are found at respectable firms, largely in consequence of their habits. Frequently by intemperance and neglect they become an easy prey to disease, and are invariably found either inmates or out-patients of our workhouses or hospitals, and from this class of men our medical men largely form their opinion as to the unhealthy nature of the trade.

And it must be borne in mind that this class of men scarcely ever join the Trades Union, or if they do, never remain long within its ranks, so are not included in my returns, and form no part of our sick experience.

Dropped Wrist.

I have carefully studied this for the past 25 years, and have noticed that it became increasingly prevalent, especially up to a short time ago. So far as the hammer hand is concerned, it is frequently caused by one or several of the following. Working upon a stock too light for the work, or cracked, or improperly wedged loose hammer face, or cracked shaft. So far as the chisel hand is concerned, working with a rung chisel may be the cause, or partial cause of the mischief, but in my opinion the increased hardness of the files and rasps of recent years has much to do with dropped wrist. Twenty five years ago rasps were chiefly made from bar-steel, but now they are made from material which in the majority of cases dare not be properly annealed, and the same applies to files. Formerly a 5½ lb. hammer was considered ample with which to cut a 14″ file, but now one 7½ or 8 lbs. is required. And when it is remembered that a slight shock to the highly sensitive muscles of the hand and wrist, repeated, as it must be, thousands of times during a day's work, will eventually seriously damage or destroy their power, the wonder to me is that a larger number are not crippled by the use of improper tools and the hard material they are called upon to manipulate.

I have found that, if taken in time, rest will in a majority of cases effect a cure, thus to my mind proving that it is the continued "jar" more than the lead which is the cause of the trouble.

Remedies.

So far as the general body are concerned, in my opinion the strict enforcement of the provisions of the Act is ample in providing facilities for washing of hands before meals and securing ample air space and limewashing of workshops. In many shops due regard is not paid to the cleansing of the floors, which in some cases are not paved. Some better system might be introduced with advantage which would lend itself to greater cleanliness in the shops.

As regards the personal cleanliness referred to, I confess I despair of ever accomplishing anything of a permanent character with men who wilfully waste their time in dissipation, and consequently have neither the disposition nor means to properly care for themselves. In my judgment, no amount of legislation will permanently assist them. They must first be led to appreciate their responsibility as men and citizens, which I fear is entirely outside the scope of this Committee.

I remain, &c.

STUART UTTLEY,

General Secretary File Cutters' Society.

SUMMARY OF EVIDENCE TAKEN BY THE DANGEROUS TRADES COMMITTEE.

File Cutting.

Manchester.

a. There is no danger to limb, and little danger to health. Cause of lead poisoning is that lead bed is not "solid," *i.e.*, fixed to the iron stock. Process of cutting and grinding different in Warrington from Sheffield. Files are filed before cutting in Warrington. They do not grind files in Warrington under 10 or 12 inches. The large ones are ground, then softened, filed, and cut. The final process is hardening. All files are softened before cutting. The cutter has the habit of licking his finger to make the resin adhere, by which he more easily holds the chisel. Many men lose the use of their left thumb; has known 6 cases of this in 15 years; knows no case of wrist-drop or of consumption. Says the dust from the chalk and charcoal, which

are put on to the face of a file which has been cut before the other face is begun, gets into the lungs. Recommends that no file should be hardened in boiling lead, which is now a common practice. All files should be filed before being cut; they should also be straight. Has known cases of colic and fits due to file cutting. Has also known illness among hardeners in the boiling lead process. Thinks no one should be allowed to lick fingers. Workers ought to wash their hands before meals. No food should be eaten in the shop. Thinks the lead bed ought to be heavier. Some masters are niggardly in giving out the pewter out of which this bed is made. There is a tap in the yard; no soap or towels are provided. The cutters are piece workers working for a firm, not on their own account.

Rainhill.

β. The cushions or beds are of zinc and pewter (see Analysis in Third Interim Report, Appendix I.). Files are very small and are forged in the shop. There is no poisoning, which is due to the small percentage of lead in the bed.

γ. Has been a cutter for 31 years; has been ill. The muscle of left thumb and forefinger atrophied. Has had colic; a fellow workman has also suffered.

Note.—Saw many file cutting shops—all with imperfect sanitary arrangements; one in particular very bad. Ventilation most defective.

Glasgow.

δ, *Partner in File Cutting Firm.*—Thinks it a healthy average trade. Never heard of a case of lead poisoning in Glasgow from file cutting.

ϵ, *Workman.*—Eight years in this firm; now a machine cutter. The secret of the illness in the trade is the habit of licking the thumb and forefinger. His father was 64 years old when he died; used to lick his thumb perpetually; was very particular about washing his hands. Attaches great importance to cleanliness: was 13 years in Sheffield. Thinks machine cutting better than hand cutting, because they can stand up to their work, whereas hand cutters are always stooping in one position. The absence of lead in machine cutting makes it healthier. Suggests that resin might obviate the thumb licking. Has seen it used both in Glasgow and Sheffield.

ζ.—Twenty one years a file cutter by hand, now at machine, at which he is only beginning. Not such hard work as hand cutting. Has always had good health. Feels no difference in health now from former employment. Did not feel ill from lead, but occasionally had acute pains. Took Seidlitz powder. Attaches great importance to washing: was in habit, also, of washing out his mouth. Has used a piece of resin, but did not approve of it, as after using it felt a curious sensation in his thumb.

η, *Foreman.*—Twenty four years a file cutter: was six months in Sheffield. Never at a machine. Knew a man called Jackson whose thumb gave way. He died. Never heard of lead colic in Glasgow. Knows scores of men who never wash their hands before meals. Thinks the lead colic in Sheffield is due to inter-marrying. File cutters marry file cutters. In Sheffield, if two or three men have a drink together, they all drink out of the same jug or pot; thinks this a dirty habit. He could never see anything dangerous about the occupation.

Sheffield.

Mr. Morris, H.M. Inspectors' Assistant.—Thinks that as direct employers or givers out of work the employer ought to be directly responsible for conditions under which file cutting is carried on. Thinks there might be a substitute for the lead bed. Copper has been tried, but the wrist will not stand it; moreover, the cut edge of the file would be impaired when turned. Vulcanite has been tried, but wore out. Small files are cut on zinc beds. Pewter is used in machine cutting. There being no responsibility now, it would be better to make all the givers out of work jointly responsible than the workman.

Dr. Sinclair White.—Three years Medical Officer of Health for Sheffield, 1885–88. Surgeon to the Royal Hospital, Sheffield, and President of the Sheffield Medical Chirurgical Society.

Considers file cutters as a class are unhealthy. Sanitary conditions are the worst part of the trade. Among causes of the unhealthy condition of the workers puts that first. Would like to see the cubic air space increased—might begin with 300 cubic feet per person. Thinks all workshops should be licensed or registered before

being used for that purpose. The landlord ought to be made responsible for the place in which the work is done. Thinks notices might be put up in the shops, showing how the workers can take precautions against lead poisoning. Thinks the lead "bed" might be altered. Paper is used in Germany as a substitute for lead in certain cases.

Note.—Referred to pamphlet of lectures before the Sanitary Institute in 1893. Copies of the pamphlet given to the members of the Committee.

Dr. H. H. Littlejohn and Dr. Porter gave evidence, besides handing in their written statements.

θ, ι and κ, Three Experienced File cutters.—Gave three cases of death from lead poisoning which had been brought to their notice:

George Burgin, aged 56, employed at Messrs. Chas. Cammell & Co., was ill about 12 months, died three days after a fit.

Fred Hardy, aged 28, worked at Messrs. Thos. Firth and Sons, ill 8 or 10 years, died in an unconscious state.

Edward Ridge, aged 49, worked at Messrs. Thos. Firth's, ill about 12 months, never gained consciousness, and died.

Witnesses have seen cases of men who lost the use of their hands. Attribute this:

1. To bad hammer heads.
2. To bad hammer shafts.
3. To the lead bed.

One workman, Thompson, lost the use of both hands; was told he was suffering from lead poisoning. Kenworthy, whom the Committee saw working, has now broken down. He lost the use of three fingers of his right hand. Witness θ had a daughter who went to Messrs. Firth's at 14. She began to get ill, and has now, after 5 years' greater or less illness, had to cease work. Recommend washing appliances and a greater amount of air space. Men work outside the workshop (at home, &c.), because they wish to work when they like, notwithstanding the fact that they have to pay for their stocks. The handcutting trade is diminishing. Spoke of a man named Thomas Cornthwaite, who every year is in the Union Hospital for three or four months from lead poisoning. He got lead poisoning from sheer dirtiness. He never washed himself for three or four days at a time. They want the shops swept out once a week. Would make them all liable for the dirtiness of a shop. κ is secretary to a sick fund which has 24 members. In six years eight members have received 24*l.* in sick pay from this fund. Witness says there should be a place to put their food in, thinks this would meet the difficulty of this question. He has himself worked 32 years, and has never been ill. Thinks 18 inches between the stocks would be sufficient. Witness θ has 34 years experience. The three witnesses jointly made the following suggestions for the prevention of lead poisoning:—

i. The carrying out of the Factory Acts in providing means for washing and allowing air-space. Inspector should visit shortly after sending notices, to see that the regulations are carried out.

ii. In America overalls are worn by file cutters, and soap and water are freely used. Whilst there, witness never knew a case of lead poisoning.

iii. Danger often caused through irregular habits of the workmen, who prefer to work "out" in order to be free from supervision.

Witnesses thought there ought to be more air-space, even if the workmen had to pay more rent. There should be also thorough inspection and insistance on cleanliness. Medical precautions should be posted up. Files are not brushed in Manchester, there is practical immunity from lead poisoning there.

Mr. Stuart Uttley also gave evidence, besides handing in a paper.

λ.—Thinks men work too close to each other. When they brush their files, they brush the lead dust off on to their neighbours.

Mr. C. Hobson, who handed in a statement, also gave evidence.

Mr. Dodgson, H.M. Inspector of Factories.—Recognised the difficulties of legislation; believes most of the illness to be due to eating with unwashed hands. Recommends strongly provision of proper washing appliances with necessaries, also increased space between the stocks. Statement inserted in Appendix XIII.*

Mr. Parkes, H.M. Inspector of Factories.—Handed in letter addressed to the Secretary, which is inserted in Appendix XI.* In evidence, dwelt principally on better ventilation, larger shops, and a greater space between the stocks.

* *See* Third Interim Report.

Note.—The Committee visited file cutting shops in Sheffield, Glasgow, Birmingham, Rainhill, Cardiff, and London.

SUPPLEMENTARY EVIDENCE.

VI.

A RETURN OF CASES OF LEAD POISONING AMONGST FILE CUTTERS IN SHEFFIELD FROM JULY 1898 TO JUNE 1899.

Date.	Name of Sufferer.	Age.	Residence.	†Employed by
July 1898	Hall, Hy.	23	3, Crookes Road	Cammell & Co.
„	Stanton, Jos.	—	26, Hicks Lane	Camm and Butcher.
„	Millward, W.	39	29, Bishop Street	Tyzack Sons and Turner.
„	Hukin, C.	—	-	Baker and Son.
„	Whitham, Thos., last worked at 9 Court, Lower Edward Street.	—	——	——
10.8.1898	*Hurt, T. W.	—	39, Eyre Street.	——
„	Gosling, Thos.	—	18, Carrfield Street	Heeley.
„	Mirfin, Alice	—	b/o 88, Carnarvon Street.	——
30.8.1898	*Cornthwaite, Thos.	—	-	Spear and Jackson.
29.9.1898	Beaver, Chas.	—	28, Marshall Street	Ellis Crossley.
„	Dew, Matthew	39	Union Infirmary	Wm. Eyre's Workshop.
„	Marshall, Wm.	26	Royal Hospital	Turton Bros. and Matthews.
„	Shipston, John	—	20 Ct., 1, Rockingham St.	Firth and Sons.
„	Eagle, Thos.	—	16, Martin Lane	Green, Napier Street.
„	Machin, Thos.	25	-	Wm. Lee, Watery Lane.
„	Wood, Richd.	—	12 Ct., 2, Barnard Street	Swift, Levick & Co.
„	Boulding, Hy.	—	-	T. Firth and Sons.
„	Smith, Albt.	—	31, Hampton Street	Park.
31.1.1899	Butcher, Geo.	—	183, Allen Street	Naylor, Meadow Street.
31.1.1899	Sheldon, Rbt.	—	10, Sittwell Place	T. Turner & Co.
3.2.1899	Roebuck, G.	—	71, Reginald Street.	——
3.2.1899	Clulow, Wm.	—	Fir Vale Infirmary.	——
8.2.1899	Hurt, T.	—	19 Ct., 7, Boston Street.	——
9.2.1899	Thompson, G.	—	30, Wentworth Street	Turton Bros. and Matthews.
25.2.1899	Atkinson, Saml.	—	11 Ct., 1, Allen Street	Marsh Brothers.
25.2.1899	Ellison, Seth	—	Hill Top, Oughtibridge	T. Turner & Co.
18.2.1899	Staniforth, Albt.	—	Fir Vale Infirmary	Makin and Sons.
14.2.1899	Brittain, Jas.	—	Fir Vale Infirmary	Riley Carr.
10.4.1899	Lister, Jos. (now dead)	—	23, Greaves Street.	——
14.4.1899	Cornthwaite, Thos.	—	Fir Vale Infirmary	Spear and Jackson.
3.5.1899	Longden, John	—	43, Broughton Road	Owlerton, Smith's Park, Allotments.
8.5.1896	Salisbury, Thos.	—	813, Penistone Road	Turton Bros. and Matthews.
15.5.1899	Yates, Jas.	—	1 Ct., 3, Porter Street	Harvey, Nixon, & Co., Napier Street.
23.5.1899	Rawson, Chr.	—	Fir Vale Infirmary	Pashley, Daisy Walk.
24.5.1899	Barratt, Edwd.	—	Fir Vale Infirmary	Hale Bros., Snow Lane.
2.6.1899	Jordan, Mich.	—	Fir Vale Infirmary	Edwd. Kirke, Townhead St.

* Names marked occur twice. † The sufferers worked for these firms, but may also have been working for others.

VII.

LETTER FROM DR. S. M. INKSTER, CERTIFYING SURGEON FOR SHEFFIELD.

Broomhill Lodge, Sheffield,
May 23rd, 1899.

DEAR CAPTAIN SMITH,

IN your letter of the 19th instant you ask me whether, in the course of my investigations of cases of lead poisoning among file cutters during the last year I have found the workshops and other sanitary conditions connected with the work of file cutting satisfactory. In reply to this I may say that in the case of the larger firms the employers are, by adopting the suggestions of the Dangerous Trades Committee, doing what they can to prevent lead poisoning among the workpeople, but in the case of the smaller shops and sheds in back yards and other places, in which most of the file cutting work is carried on, absolutely nothing is being done in any way to prevent the evil. Sheffield file cutters are peculiar people to deal with; they have ideas of their own, very conservative in their methods, dirty in their working habits, and very careless of results. They will listen to your suggestions, but will tell you very

distinctly to mind your own business, and they will attend to theirs. Nothing, to my thinking, will stop lead poisoning among them but the stoppage of the trade; fortunately this is being rapidly done by the introduction of machinery for such work. An outsider can form no idea of the amount of suffering, disablement, and premature deaths caused by lead poisoning among such people. Until it became my duty to investigate these cases I had no conception of the extent of the evil, or how insidious and far reaching it was; file cutting indeed is a dangerous trade, and ought either to be ended or mended. To end it would be the best, to mend it effectually you *must* substitute some other bed for the lead one now in use, but they all say that that is not possible, still, nothing else will put a stop to lead poisoning. The ending of it is coming, I think quickly, meantime something may be done to mitigate the evil by following out the suggestions of your Committee.

Yours, &c.

S. M. INKSTER.

VIII.

LETTER FROM DR. C. N. GWYNNE, CERTIFYING SURGEON FOR SHEFFIELD.

Highfield House, Sheffield,

DEAR SIR, May 23, 1889.

IN your letter of the 19th inst., you asked me to give my views concerning plumbism occurring among file cutters, and you direct my attention especially to—

(*a.*) the sanitary condition of the workshops;

(*b.*) the means provided for washing;

(*c.*) the steps taken to prevent the clothes of the workers being saturated with lead;

(*d.*) you ask me for any suggestions I may think fit to offer.

I will take up your points in the order you present them:—

(*a.*) Most of the file cutting shops seem to be relics of a time when sanitation was practically ignored—generally erected in back yards in the poorer districts of the city, surrounded by middens rarely emptied and always offensive, with almost entire neglect of ventilation, and cleanliness at a discount, and all these evils aggravated by overcrowding.

Except in a few instances I have failed to see much amelioration of these conditions.

(*b.*) A basin and towel are now generally to be seen in most shops, but in none have I seen an adequate supply of running water, and the means provided for washing are not sufficiently utilised by the workers.

(*c.*) The wearing of over-all suits is quite the exception. A certain proportion of the workers wear aprons.

The suggestions I would offer are:—

(*d.*) That the worst workshops be closed with as little delay as possible. That all workshops be registered for a certain number of workers only, and a certificate be provided by the Inspector of Factories. That the new shops to provide for workers turned out of overcrowded shops should be built in situations, and in accordance with regulations as to cubic space, ventilation, water supply, &c., laid down by the authorities. That all file cutting shops be visited at least once in two months, and the workers examined by the certifying surgeon. That workers reported by him to the factory inspector as suffering from plumbism shall be compelled to cease working, and shall not after such suspension be allowed to resume work without a certificate from the certifying surgeon.

Speaking generally on the whole question, I fear that all regulations that may be laid down will fail of their object unless the co-operation of the workers themselves is secured, and this object will I think be best attained by the frequent visits and admonitions of the certifying surgeon, and by a printed notice detailing the dangers of the trade, and the best means of escaping them, being hung up in a conspicuous position in every file cutting shop in the city.

I have, &c.

C. NELSON GWYNNE,

Certifying Surgeon.

IX.

EXTRACTS FROM PAMPHLET CONTAINING A LECTURE DELIVERED BY SINCLAIR WHITE, M.D., F.R.C.S. ENG., D.P.H. CAMB., LECTURER ON PUBLIC HEALTH, SHEFFIELD MEDICAL SCHOOL, &c.

I have selected the cutlery and file trades for my lecture, partly because they are industries which find employment for a large number of workmen in the district in which I reside, and I am thus able to speak of them from personal observation, and partly because they illustrate in several ways the need which exists for drawing the attention of the community in general, and the Legislature in particular, to defects in the sanitation of occupations.

. . . . . .

Hand file cutters are exposed to two special dangers to health; one of these arises from the overcrowded and badly ventilated rooms in which they work, and will be fully considered when I come to discuss the sanitary condition of the workshops; the other is due to the employment of a lead bed on which the files are cut, and is a terrible scourge to the trade.

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At each stroke of the hammer a fine cloud of dust containing much lead rises in the air, and as the file cutter sits with his face directly over the anvil he must perforce inhale some of this lead dust.

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The ill effects resulting from the employment of lead in file cutting are only too well known. Colic, paralysis of the extensor muscles of the wrist and thumb, gout and Bright's disease, are the most evident of its protean evils; but long before it produces these definite maladies its influence on the body is both seen and felt. The sallow anæmic countenance presented by the file cutter is most characteristic of his calling, while inquiry will often elicit a history of constipation, indigestion, and bodily weakness long antecedent to the development of more alarming maladies.

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. . . . . Idiosyncrasy of constitution renders certain workmen highly susceptible to the pernicious effects of lead . . . . . Thus a highly intelligent workman informed me that he was the oldest of five brothers, all of whom were file cutters and careful in their habits, yet four of these had died from the effects of their trade, and he himself had had lead colic.

. . . . . .

By way of sampling file cutters, I examined a hundred men, taken haphazard . . . . . Their average age was 37 years, and they had been working at their trade on an average for 23½ years. Seventy four had a lead line on their gums, twenty eight had suffered from lead colic, and twenty had at some time been afflicted with paralysis of the wrist or thumb.

These figures, however, do not show the full extent of the mischief, because file cutters, when they become seriously paralysed in the wrist, are unable to follow their employment, and either take to some other calling, or too frequently become a burden to the community, until a life of decrepitude and disease terminates in premature death.

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I have examined a number of machine cutters in order to ascertain if they suffered from lead poisoning. The problem is complicated by the fact that many machine cutters were formerly hand cutters; but my observations led me to the conclusion that machine cutting rarely, if ever, gives rise to this malady.

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. . . . . file cutting by hand . . . . . is usually done by outworkers in shops which they rent for their use. These workshops are commonly one-storied buildings, situated in courts and yards, and surrounded by dwelling-houses. Many of them are in close proximity to middens which receive the excreta of the surrounding inhabitants, and are nearly always wet and offensive. Occasionally the file cutters' shop is placed under the same roof with a midden, being separated from it by a thin brick wall . . . . . .

I measured 21 workshops, in which one hundred and nine file cutters worked, and found the average space to be equal to 167 cubic feet per worker, and in one instance it was as little as 100 cubic feet. It should be added that these shops were not specially selected.

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The mortality column for file makers shows that 453 in every 1,000 deaths occur between the ages of 35 and 55 years, as compared with 261 for all adult males, and that only 198 in every 1,000 takes place after the age of 64 years, as compared with 391 for all adult males.

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The Registrar-General's estimate for file makers . . . . . shows similar results. His general mortality figure for these workmen is 1,667 as compared with 1,000 for all males at corresponding age periods, while his special mortality figure for phthisis and other diseases of the respiratory organs is for file makers 783 as compared with 402 for all males. Moreover he shows that the mortality from lead poisoning among file cutters is more than twice as great as that among any other class of workmen.

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Had it been possible to compile a mortality column for file cutters only, there can hardly be a doubt that it would have shown a higher mortality still.

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It would appear that the same irresponsibility can be claimed by cutlery manufacturers who let rooms or parts of rooms to their workmen; and that if the inspector insists on fans or other needful appliances being provided, he must proceed legally against the workmen.

The outcome of all this is, that it is difficult or impossible to apportion responsibility for sanitary requirements, the inspector's work is enormously increased, and often rendered excessively irksome, while the amount of good he can effect is proportionately lessened.

There is but one remedy for this state of things. Sooner or later the Legislature will have to fix on the individual who lets off rooms and power to workmen the responsibility for carrying out the provisions of the Factory Acts.

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Having regard to the unhealthy character of the work done by grinders, file cutters, and certain classes of cutlers, the Home Secretary should direct the Chief Inspector of Factories to draw up Special Rules under section 8 of the 1891 Act, containing requirements to be observed in places where these trades are carried on. The rules should specify the minimum cubical space per worker permissible, together with the special means to be provided in each case for the removal of dust and impure air.

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Bearing in mind the poisonous nature of a file cutters' trade, ample air-space should be insisted on, not less than 300 cubic feet per worker; and this should be conjoined with suitable means for ventilating the workshops.

File-cutters' shops that are placed in close proximity to foul middens, or so surrounded by buildings that ingress of fresh air and sunshine are impossible, should be closed as unfit for habitation.

A lavatory with water, soap, and nail brushes should be provided for washing the hands after work, and workmen should be discouraged from eating or storing their food in the workshops.

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In conclusion, let me impress on you the supreme importance of trade sanitation. . . . . Let it be our aim to make the sanitary condition of our factories and workshops also a source of national pride.

X.

LETTER FROM PROFESSOR T. E. THORPE, F.R.S.

Government Laboratory, Clement's Inn Passage,
Strand, London, W.C.,
16th June 1899.

SIR,

"WITH reference to your letter of the 19th instant, I beg to inform you that the samples of dust taken from file cutting shops have been examined for lead as desired, and I now send you the result of the analyses.

All the samples contained fragments which could not be considered dust, and, except in the case of the two samples taken from the rafters, particles of lead could be seen. The coarser matters were, therefore, first removed by passing the samples through a

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sieve containing 60 meshes to the inch, and the siftings were then examined for lead with the following results, viz. :—

	No. 1 Shop.*	No. 2 Shop.†
Dust from rafters - - - - - -	Nil	2·64 per cent. of metallic lead.
„ top of stock - - - - - -	22·28	14·82 „
„ floor under stock - - - - -	4·37	2·63 „

* Shop where files for sharpening swords are made ; only two stocks in it.
† All classes of work done in this shop.

I am, &c.
T. E. THORPE.

Capt. H. P. Smith, R.N.,
Heatherleigh, Sheffield.